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Indoor Air Pollution Source Database

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INDOOR AIR POLLUTION SOURCE DATABASE

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ABSTRACT

This paper is directed to individuals interested in indoor air pollution. The material presented is an introduction to and directions for use of the indoor air pollution source database. The indoor air source emissions database is a computerized system containing source characterization studies done in the United States and abroad. It addresses the entire range of indoor air sources: combustion, material, and activity sources. It provides ready access to such information as: emission factors determined for each of the pollutants and sources tested, data about the test facility, conditions of the experiment, sampling, and analytical data, and an abstract of each publication. The program also includes options for researchers carrying out their own source characterization studies, allowing them to add their data to the database and to arrange the data in a format suitable for searching. The database is currently available in a dBase III version or a Clipper compiled version.

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16. ABSTRACT The paper, directed to individuals interested in indoor air pollution, is an introduction to, and directions for the use of, the indoor air pollution source database (also known as the indoor air source emissions database). The database is a computerized system containing source characterization studies done in the U.S. and abroad. It addresses the entire range of indoor air sources: combustion, material, and activity sources. It provides ready access to such information as: emission factors determined for each of the pollutants and sources tested, data about the test facility, conditions of the experiment, sampling and analytical data, and an abstract of each publication. The program also includes options for researchers carrying out their own source characterization studies, allowing them to add their own data to the database and to arrange the data in a format suitable for searching. The database is currently available in a dBase III version or a Clipper compiled version.

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Information Systems	Indoor Air	09B
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INTRODUCTION

High concentrations of pollutants in the indoor environment can often be traced to indoor sources. The importance of these sources has been recently emphasized by weatherization and energy conservation techniques, which decrease the infiltration of ambient air and allow the concentrations of harmful chemicals to accumulate in the indoor environment.

There are several ways to attack the indoor air pollution problem, including increased ventilation and indoor air cleaners. A more effective method in many cases involves identifying the high-emitting source in the environment and removing or modifying the sources. For these tasks, source characterization work must be done, and the findings must be readily available.

The U.S. Environmental Protection Agency recognized the need to gather available source characterization experimental data into a computerized database to provide the medium for data transfer between source characterization researchers and interest groups including monitoring teams, policymakers, private industry, and consumer's groups.

The indoor air source emissions database is a computerized system compiling data from source characterization studies done in the United States and abroad. It addresses the entire range of indoor air pollution sources: combustion, material, and activity sources, and makes readily available the emission factors determined for each of the pollutants and sources tested, data about the test facility, conditions of the experiment, sampling and analytical data, and an abstract of each publication.

The programming also includes useful options for researchers performing their own source characterization studies, allowing them to add data to the database and arrange the data in a format suitable for searching. In doing so, the results from the research field will become more uniform in methods of reporting such data and more consistent in format and units.

The database is currently available in either a dBase III language or a Clipper compiled version. The compiled version may be used on any IBM or compatible microcomputer disk operating system (DOS) with or without dBase III. The dBase III version is the original programming language. A copy of dBase III, knowledge of the language, and a dBase III version of the database may allow the user some additional flexibility in use of the database. This flexibility will be covered in the user's manual. Everything covered in this paper may be done in either version.

STRUCTURE

The indoor air source emissions data base is currently composed of 5 databases linked together in hierarchical structure. The names of the databases are: BIBLIO, SOURCE, COND, SAMPLE, and POLL.

All of the experimental data are compiled within this structure. The BIBLIO database carries the primary citation, the abstract, and the test facility information. The SOURCE database contains data on the particular source and its pretest treatment. The COND database includes information about the conditions of the experiment such as temperature, humidity, vent rate, and/or (with certain combustion sources) fuel rate, and fuel composition. Likewise, the SAMPLE database has information on the sampling and analytical methods; whereas, the POLL database catalogs pollutant information and the emission factors that were determined.

The five databases are connected by four tying numbers. These numbers allow data to be linked, arranged, and searched on any one or several of the five database levels. These procedures will be expanded upon in later sections.

USAGE

Manipulation of the database is simple enough as to not discourage even the most timid of computer novices. Simply type MENU in the Clipper compiled version or DO MENU in the dBase III version to obtain a list of options. A menu will appear:

MENU

1. USE HELP.
2. ADD NEW RECORDS TO THE FILES.
3. DO PRE-PROGRAMMED SEARCHES.
4. DO DETAILED SEARCHES.
5. DISPLAY ABSTRACTS.
6. EXIT.

A particular option is selected by entering the appropriate number. Each of these options is outlined below.

OPTION 1. HELP

Choosing this option leads the user to a submenu:

FURTHER INFO ON:

1. GENERAL USAGE.
2. ADDING RECORDS TO FILES.
3. PRE-PROGRAMMED SEARCHING.
4. DETAILED SEARCHING.
5. DISPLAYING ABSTRACTS.
6. ERRORS.
7. FIELDNAME DEFINITIONS.
8. GLOSSARY.
9. RETURN TO MENU.

These options will display on-the-screen directions or further descriptions of the options on the original menu (Options 2 through 5), and information on general usage, errors, fieldname definitions (the database structure), and a glossary. Information on the HELP options is also provided in the user's manual.

OPTION 2. ADDING RECORDS TO FILES

This option allows source characterization researchers to add records to the existing files. A pre-written program then arranges them in a searchable form. Some further instructions about the fields and the tying numbers should be reviewed in the user's manual before the user actually adds data to the database.

OPTION 3. PRE-PROGRAMMED SEARCHING

Pre-programmed searching will perhaps be the most-used option on the original menu. Pre-written programs allow several searches to be done by simply choosing selections from submenus. No lines of text need to be typed in; the programs are all extremely user-friendly and self-explanatory. After choosing this option the following submenu will appear:

A PRE-PROGRAMMED SEARCH BY:

1. SOURCE CLASSES.
2. SOURCES.
3. POLLUTANTS.
4. SOURCE CLASSES AND POLLUTANTS
5. SOURCES AND POLLUTANTS.

The five selections will display all possible entries in the database. The user simply chooses a source class, source, and/or pollutant from the options available to display more information on the subject.

For instance, the user may choose selection 2., SOURCES. The submenu option would contain many possibilities. The following choices would be among them:

1. particleboard
2. chipboard
3. gypsumboard

The user may wish to view chipboard experiments. He/she would select option 2 from this submenu. The database will then tell the user how many records in the database involve chipboard. (A record in this case would be a source, pollutant, and emission factor set.) He/she may next choose to:

1. DISPLAY ALL DATA.
2. DISPLAY LIMITED DATA.

The choice of LIMITED DATA will display the source, pollutant, and emission factor in the proper units and a number to reference the experiment. ALL DATA will display all of the data included in the database about the source, conditions of the experiment, sampling and analytical methods, pollutants, and emission factors.

In this case, the user chooses Option 2., LIMITED DATA viewing and then prints a hard copy of the data.

After viewing this information, the user may wish to view extensive data on chipboard/formaldehyde combinations. From the original menu he/she would make the following selections: OPTION 3. PRE-PROGRAMMED SEARCHES, from the next menu OPTION 5. SOURCES AND POLLUTANTS, from the source menu OPTION 2. chipboard, and from the pollutant menu, perhaps OPTION 7. formaldehyde. He/she then decides to 1. DISPLAY ALL DATA. and (Y)es to print a hardcopy. The user now has two printouts. One contains the source, pollutant, emission factors, and experiment numbers of all pollutants linked with chipboard. The second contains all information available within this database on chipboard and formaldehyde combinations.

For the above results, the user did not need to type in a single line of text, or even read the user's manual.

OPTION 4. DETAILED SEARCHING

A detailed search can do everything the pre-programmed searches do and also search on additional fields. While pre-programmed searches can be done by simply making a number selection, with detailed searches the user must physically enter the criteria desired. This allows the user the flexibility of specifying source, pollutant, test facility category, loading, temperature, humidity, vent rate, fuel value, fuel rate, sampling method, analytical techniques, and other condi-

tions of the experiment. The user then may choose to display either specific fields, or all the data included on the experiment requested.

At present the user should review the fieldname definitions and the appropriate section in the user's manual before attempting a detailed search. The entries must be made within the fields of the proper database: BIBLIO, SOURCE, COND, SAMPLE, POLL. An example search is given on the screen:

DATABASE -> FIELDNAME = 'SPECIFIC ENTRY'

SEARCHING FIELD(S): SOURCE -> TYPE = 'CHIPBOARD' .AND. POLL -> POLLUTANT = 'FORMALDEHYDE' .AND. VAL (COND->TEMP) < 35 .AND. VAL (COND->TEMP) >10

This example will limit the searches to those experiments with source types of chipboard, pollutants of formaldehyde, and values (VAL) of temperature between 10 and 35°C. As many or as few qualifiers (searching fields such as source type, pollutant, temperature, humidity, and air exchange rate) may be added as the user wishes.

The user then may choose to display any or all data within each database. An example follows:

DATABASE->FIELDNAME

DISPLAYING FIELDS: SOURCE->TYPE, COND->TEMP, COND->VENT RATE.
COND->HUMIDITY, POLL->POLLUTANT, POLL->CALC_EMISS

The above example will display the source type, temperature, vent rate, humidity, pollutant, and emission factor in the proper calculated units.

OPTION 5. DISPLAYING ABSTRACTS

In the above two searches, the user could display selected fields of data or all of the data. Neither will display the abstracts. After choosing Option 5, the submenu appears:

SEARCH FOR ABSTRACT BY:

1. BIBLIO NO
2. AUTHOR'S NAME

The BIBLIO_NO is the experiment identifying number mentioned in the limited searches. To search by BIBLIO_NO the user may choose Option 1 and then type in the proper entry. The second option allows a search upon any of the authors listed in the citation. The user should select Option 2 and enter the name as requested.

OPTION 6. EXITING

This option allows the user to exit to dBase III if the disk is in dBase III langugage or to the disk operating system if the disk is in Clipper compiler form.

CONCLUSIONS

The indoor air source database was developed by the Hazardous Air Technology Branch of the U.S. Environmental Protection Agency's Air and Energy Engineering Research Laboratory at Research Triangle Park, North Carolina. The database currently contains approximately 60 publications on experimental data published before May 1985, and has several entries on combustion sources and criteria pollutants, and several entries on material sources and formaldehyde. The database will be updated periodically, and comments received will be considered for future programming or design features of interest.